

A PRELIMINARY SURVEY OF THE METEOROLOGY OF KIMBERLEY.

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The present paper is intended as a further contribution to the meteorology of the Table-land of South Africa, arranged in a form suitable to the requirements of the physicist. Earlier instalments of the same series appeared from time to time in the *Transactions* of the South African Philosophical Society. The results given are deduced from observations made at Kenilworth (Kimberley) during the fifteen years 1897-1911. They show, in addition to yearly means and totals, deviations from the monthly mean values of all the more important recognised meteorological elements referred to the deviations from the monthly mean wind-direction resultant as argument. They are almost entirely statistical and tabular, and require very little in the way of explanatory setting at this time. Such results as these made at various places throughout the world have a certain amount of importance in view of the researches of Hildebrandsson and others on the centres of action of the atmosphere, and for other reasons.

Table 1 gives the mean monthly direction of the wind deduced from the continuous records of an Osler anemometer. The Table shows the north and east components in hours; the azimuth measured from the east point round by north; and the magnitude of the resultant. The north component is at its maximum in February and July, and at its minimum in May and October; while the east component has one maximum in June and one minimum in December. Thus there is a double oscillation in the year, the resultant direction starting from about north in January, tending gradually to about east in May, turning slightly towards the north in June and July, after which it travels forward from east round by south and west for the rest of the year. The mean direction is about east by north and the magnitude of the resultant 1,083 hours. Table 2 shows that the resultant in any one year will probably not differ greatly from this mean value either in direction or magnitude—1897 and 1911 being exceptional years.

Table 3 gives the monthly deviations from the monthly means of

Table 1. The azimuths are counted *plus* when the deviation is counter-clockwise up to 180° , and minus when it is clockwise up to the same angular distance. Thus the mean azimuth in January, 1897, was 122° , and because the normal mean azimuth for January is 85° the deviation appears as $+37^\circ$. The individual monthly azimuths vary much more widely from the normal means than the annual ones do, the range of deviation being the best part of two right angles on one side or the other of the normal. So also the monthly deviations of the magnitude of the resultants given in Table 4 are considerable.

	Kenilworth.	Kimberley.	Difference.
	Inches.	Inches.	Inch.
Jan.	26·047	25·970	·077
Feb.	·080	26·013	·067
Mar.	·063	25·993	·070
April	·202	26·131	·071
May	·190	·117	·073
Jun.	·319	·242	·077
July	·214	·140	·074
Aug.	·234	·161	·073
Sept.	·165	·096	·069
Oct.	·070	·000	·070
Nov.	·041	25·967	·074
Dec.	·023	·951	·072
Year	26·137	26·065	·072

Table 5 gives the deviations of each month's mean wind velocity from the normal means. The normal means are shown at the foot of the Table. If this Table could be entirely trusted, the last column (showing the annual deviations) would indicate a more or less gradual falling off in the velocity of the wind year by year. It is probable, however, that this result is partly real and partly due—

(1) To some wearing of the bearings of the Robinson anemometer, and
 (2) to some gradually increasing obstruction to the exposure of the instrument by growing trees. From a meteorological point of view these trees are a great nuisance. They seriously handicap not a few of the observations made at Kenilworth, and cannot, besides, by any stretch of the imagination, be called beautiful. As to the wearing of the bearings, this, such as it is, is caused by the grit which is blown about in every dust-storm, and which penetrates everywhere.

Table 6 gives the *plus* and *minus* values of barometric pressure for

Kenilworth derived from readings of a large observatory standard barometer—the readings being made three times a day, at VIII., XIV., and XX., civil time. The mean of the pressures at these hours is practically the same as the mean of the hourly readings.

The late Mr. G. J. Lee took a series of meteorological observations from 1890–7 at his own second-order station in Jones Street, Kimberley. His observations of pressure were made at VIII. and XX. with a small Fortin barometer, and considering the difference of altitude between Kimberley and Kenilworth, they compare very well with those of Kenilworth. The Jones Street results have been computed and shown in Table 7. The table on the opposite page gives the respective monthly means for 1897.

After reducing the Kimberley annual means to the Kenilworth level, and smoothing the values in threes by Bloxam's method, we have the following series, some corresponding values for Durban and Mauritius being added for purposes of comparison :—

	Kenilworth.	Durban.	Mauritius.
	Inch.	Inch.	Inch.
1890	(−·007)	+·011	+·014
1	−·010	−·009	+·002
2	−·012	−·011	+·005
3	−·012	−·013	−·009
4	−·005	−·002	−·004
5	+·003	+·004	−·006
6	+·004	·000	·000
7	+·009	+·001	−·003
8	+·010	+·006	−·003
9	+·008	+·006	+·006
1900	+·007	+·011	+·017
1	·000	−·003	
2	−·004	−·005	
3	−·005	−·011	
4	−·003	−·007	−·004
5	+·003	−·003	+·001
6	+·001	+·003	−·007
7	−·001	+·005	−·010
8	−·002	(·000)	−·013
9	−·006		−·016
1910	+·001		
11	(+·013)		

Thus the irregular oscillations of pressure of long period, in the southern anticyclone belt, affect Kimberley and Durban similarly, but not Mauritius.

Table 8 gives the monthly deviation of the duration of sunshine from the normal means—shown as in the other Tables at the foot; and Table 9 the cloudiness of the sky. The numbers in these two Tables are, as a rule, the inverse of each other, the cloudiness tending to a maximum when the sunshine is a minimum.

Table 10 gives the monthly durations of rainfall in hours. The yearly deviations are shown in the last column.

Tables 11 and 12 give the approximate duration of electrical phenomena from eye and ear observations. The numbers in these two Tables, especially the latter, must be regarded as lower limits, for some thunder must escape hearing, and some lightning must escape attention on account of the obstruction to the horizon by trees.

The five Tables 8–12 are in fair agreement with each other; but neither exhibits such concordance with Table 6 as might have been expected.

Table 13 gives the deviation values for what is called the “temperature in the sun” as registered by a maximum black bulb *in vacuo*. In this Table the year 1909 is remarkable, every month save February showing a temperature higher than the normal mean of the month. Of the year 1897 the same may be said, though to a less degree. The year 1909 was the most clouded year of the period, while, curiously enough, 1897 had the least cloud. The monthly maximum temperatures in the shade show no such agreement (Table 14).

Tables 15 and 16 give minimum temperature deviations, in the shade and over a grass lawn respectively.

Tables 17, 18, 19 give respectively the temperatures of the dry bulb, the temperatures of the dew-point, and the relative humidities deduced from hourly readings of the dry and wet bulb thermometers.

Table 20 is supplementary to the general purpose of this paper. It gives the rainfall of Kimberley from 1877 to 1896, as observed by the late Mr. F. W. Matthews, and the rainfall of Kenilworth from 1894 to 1911.

Comparing now the monthly *plus* and *minus* values of the deviation from the normal wind direction with the *plus* and *minus* values of the other elements (leaving out zero deviations), we have the following results:—

	Like Sign.	Unlike Sign.
Magnitude of resultant	93 times	82 times
Barometric pressure	104	68
Sunshine	82	83
Cloud	88	74
Thunderstorms	82	81

	Like Sign.	Unlike Sign.
Lightning	82	82
Max. temperature in sun	84	87
„ „ „ shade ...	93	78
Min. „ „ „ „ ..	96	75
Min. over grass.....	93	78
Dry bulb	102	69
Dew-point	95	76
Relative humidity	86	88

The meaning of this summary will be understood from a single example: In 172 months the barometric-pressure deviation and the wind-resultant deviation were both positive or both negative (*i.e.*, they had the same sign) 104 times; while in the remaining 68 times the deviations of the two were in opposite directions (*i.e.*, they had unlike signs).

But on the whole it may be said that the above summary shows no very strong dependence of the greater number of the elements upon the deviation of the wind-direction resultant from its normal mean direction. If, however, the comparison be made month by month, a much better case is made out. For example, if the sunshine deviations be taken in periods of three months each, we get the following numbers:—

	Like Sign.	Unlike Sign.
Dec., Jan., Feb.	27 times	14 times
Mar., April, May	20	23
June, July, Aug.....	24	18
Sept., Oct., Nov.....	11	28

That is, in December–February and in June–August the sunshine deviations and the azimuth deviations agree in the majority of cases. Now in the period December–February the mean resultant direction of the wind is nearly north, and in the period June–August nearly east. Hence in the first period an excess of sunshine will accompany a deviation to the west in the direction of the wind; and in the second period there will be an excess of sunshine when the vane tends more to the north. Again, in the period September–November the mean resultant is southerly; and in this period we get less sunshine when the deviation is towards the east, and more sunshine when the deviation is towards the west. Of the cloudiness of the sky practically the opposite may be said. Thus on the whole a westerly tendency in the wind indicates clearer skies, and an easterly tendency more cloud, and also more thunderstorms and more sheet-lightning. The following are the numbers for these three elements:—

1. Cloud.	Like Sign.	Unlike Sign.
Dec., Jan., Feb.	12 times	28 times
Mar., April, May	27	14
June, July, Aug.	21	20
Sept., Oct., Nov.	28	12
2. Thunderstorms.		
Dec., Jan., Feb.	15 times	26 times
Mar., April, May	19	24
June, July, Aug.	22	18
Sept., Oct., Nov.	26	13
3. Lightning.		
Dec., Jan., Feb.	14 times	29 times
Mar., April, May	25	18
June, July, Aug.	22	17
Sept., Oct., Nov.	21	18

In summer the maximum temperature in the shade rises or falls according as the deviation of the resultant wind direction is positive or negative, whereas in the spring the case is the other way about. Thus in both seasons a deviation to the west in the vane means an increase of temperature. The minimum temperatures, both in the shade and over the grass, on the other hand, are higher when the vane tends easterly.

Lastly, in the summer the temperature of the dew-point rises as the vane tends easterly; whereas for the rest of the year the rise corresponds with a positive deviation in the resultant direction of the wind.

TABLE 1.
MEAN RESULTANT DIRECTION OF THE WIND, 1897-1911.

	North.	East.	Azimuth.	Magnitude.
	Hours.	Hours.	°	Hours.
Jan.	+104	+ 9	85	104
Feb.	+114	+ 77	56	137
Mar.	+ 65	+128	27	143
April	+ 46	+131	19	139
May	+ 5	+149	2	150
June	+ 25	+183	8	184
July	+ 73	+206	19	219
Aug.	+ 3	+107	2	107
Sept.	- 6	+ 85	356	85
Oct.	-100	+ 19	280	102
Nov.	- 72	- 15	258	74
Dec.	- 11	- 23	205	26
Year	+245	+1055	13	1083

TABLE 2.
ANNUAL RESULTANT DIRECTION OF THE WIND.

	North.	East.	Azimuth.	Magnitude.
	Hours.	Hours.	°	Hours.
1897	- 500	- 245	244	557
1898	+ 296	+1420	12	1451
1899	+ 128	+1542	5	1547
1900	+ 167	+ 887	11	903
1901	+ 468	+ 878	28	995
1902	+ 396	+1168	19	1233
1903	+ 199	+ 568	19	602
1904	+ 277	+1205	13	1236
1905	+ 844	+ 931	42	1257
1906	+ 592	+ 817	36	1009
1907	+ 453	+1420	18	471
1908	+ 135	+ 599	13	614
1909	+1114	+1442	38	1822
1910	+ 459	+1431	18	1503
1911	- 18	+1701	359	1701

TABLE 3.
MONTHLY RESULTANT DIRECTIONS OF THE WIND IN DEVIATIONS FROM THE MONTHLY MEANS.
(1) AZIMUTH.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897	+ 37	+ 148	- 29	+ 100	+ 111	- 61	- 52	+ 3	- 78	- 25	- 23	+ 23
1898	- 44	- 33	+ 16	- 7	+ 7	+ 1	+ 3	+ 21	- 61	- 34	- 157	- 57
1899	- 8	- 29	- 19	+ 3	+ 2	0	8	- 8	+ 13	- 45	+ 60	+ 70
1900	+ 40	- 15	+ 35	- 11	- 14	- 11	+ 2	- 34	- 56	- 38	- 53	- 62
1901	+ 88	- 31	- 5	+ 10	- 29	+ 20	- 19	+ 35	+ 27	+ 66	- 47	- 62
1902	+ 46	+ 1	- 20	- 37	+ 19	- 34	+ 5	- 91	- 16	+ 23	+ 10	+ 88
1903	+ 162	+ 10	- 102	- 58	- 21	- 15	- 3	+ 34	+ 13	- 42	+ 6	- 61
1904	- 31	- 18	+ 9	+ 4	- 20	+ 40	- 14	- 29	+ 39	+ 3	- 21	+ 56
1905	+ 1	+ 32	- 1	+ 27	+ 34	- 72	+ 17	- 62	- 23	?	+ 112	+ 153
1906	+ 23	+ 44	- 9	- 39	0	+ 58	0	+ 34	- 11	+ 42	+ 162	- 165
1907	- 4	+ 2	+ 13	- 9	- 8	+ 2	- 14	- 19	+ 39	+ 55	0	- 116
1908	+ 31	+ 42	- 74	- 67	+ 17	- 23	+ 18	- 41	- 20	- 37	- 49	- 140
1909	+ 44	- 5	+ 11	- 28	+ 1	- 32	+ 2	+ 59	+ 13	- 34	3	- 31
1910	- 10	- 7	- 15	+ 26	- 1	+ 6	+ 9	- 55	0	+ 90	- 48	+ 104
1911	- 128	+ 1	+ 2	- 16	- 2	- 6	- 1	- 35	- 4	+ 40	+ 113	+ 24

TABLE 4.
MONTHLY RESULTANT DIRECTIONS OF THE WIND IN DEVIATIONS FROM THE MONTHLY MEANS.
(2) MAGNITUDE IN HOURS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897.....	10	- 84	- 10	+ 53	- 113	+ 63	- 181	+ 92	- 28	+ 132	+ 272	- 2
1898.....	4	+ 58	+ 49	+ 41	+ 45	+ 70	+ 32	+ 193	+ 75	+ 162	- 18	+ 31
1899.....	35	- 31	+ 8	+ 126	+ 124	+ 31	+ 73	+ 32	- 57	- 55	+ 84	+ 36
1900.....	57	- 30	+ 22	+ 42	+ 43	+ 117	+ 30	- 13	+ 10	+ 1	+ 52	+ 3
1901.....	+ 93	+ 4	+ 63	- 24	+ 72	+ 122	- 86	+ 117	+ 34	+ 8	+ 88	+ 86
1902.....	- 29	+ 22	+ 62	+ 9	+ 64	- 19	+ 36	- 38	- 11	+ 50	+ 202	+ 81
1903.....	- 62	- 87	- 70	+ 7	- 35	- 54	- 62	- 21	+ 53	+ 72	+ 12	+ 41
1904.....	+ 83	+ 55	+ 158	- 98	+ 67	- 61	+ 9	+ 1	+ 40	- 50	+ 5	+ 118
1905.....	+ 110	+ 39	+ 50	+ 64	- 100	- 113	+ 80	- 52	- 22	?	+ 72	+ 71
1906.....	+ 89	- 24	- 32	- 40	- 23	- 13	- 27	- 55	- 14	+ 28	+ 5	+ 52
1907.....	+ 72	+ 51	- 17	+ 94	- 34	+ 36	+ 53	- 9	+ 118	+ 50	+ 86	+ 17
1908.....	- 61	+ 67	- 108	- 51	+ 60	- 16	+ 72	- 45	+ 10	+ 114	+ 2	+ 14
1909.....	+ 306	+ 198	+ 28	+ 73	+ 42	+ 162	+ 3	+ 78	+ 16	- 45	+ 42	+ 137
1910.....	+ 56	+ 14	+ 116	+ 72	- 119	+ 60	- 8	+ 62	+ 55	- 49	- 34	+ 3
1911.....	- 27	+ 45	+ 132	+ 101	+ 155	+ 37	+ 40	+ 90	- 8	+ 49	- 9	+ 173

TABLE 5.

MONTHLY VELOCITIES OF THE WIND. DEVIATIONS FROM THE NORMAL MONTHLY MEANS, IN MILES AN HOUR.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	+0.9	+1.4	+1.5	+1.8	+1.8	+1.5	+1.6	+1.8	+1.1	+1.3	+1.7	+2.0	+1.5
1898	+1.4	+1.1	+0.4	+1.4	+2.9	+0.7	+2.1	-0.1	+0.5	+1.7	+0.6	+1.3	+1.1
1899	+1.2	+1.5	+0.7	+1.0	+1.1	+0.4	+1.5	+1.4	-0.7	+0.2	-1.0	-0.7	+0.6
1900	-0.4	+0.6	+0.3	-0.6	-1.0	+0.8	+0.7	+0.2	-0.2	+0.6	+0.7	+0.3	+0.1
1901	+1.4	+1.0	+0.3	-0.2	+0.7	+0.7	-0.2	-0.3	+0.5	+0.1	+0.9	+0.5	+0.4
1902	+0.6	+0.1	-0.3	-0.3	-0.1	-0.1	+0.3	+1.0	+1.6	+0.7	+0.6	-0.1	+0.3
1903	+1.0	+0.4	+1.0	+0.5	+0.3	+0.7	+0.1	-0.4	-0.4	+0.3	-0.3	-0.6	+0.2
1904	-1.4	-0.9	-1.1	-1.1	-1.2	-0.6	-0.9	-1.6	-0.3	-0.5	-0.3	+0.4	-0.8
1905	0.0	-0.3	-0.1	-1.1	-0.6	-0.4	-1.2	-0.6	-0.5	-1.4	-1.2	-0.9	-0.7
1906	-1.6	-1.4	+0.5	-0.4	-0.7	+0.1	-0.3	0.0	+0.1	-0.2	+0.1	+0.8	-0.3
1907	-0.4	-0.6	-0.4	+0.6	0.0	-0.5	-0.6	-1.2	-1.0	0.0	-0.2	-0.3	-0.4
1908	+0.2	-0.2	+0.8	+0.3	-1.3	-0.8	-0.9	-0.1	-0.6	-1.5	+0.6	-1.0	-0.4
1909	-1.4	-1.3	-1.4	-1.2	-0.9	-1.1	-0.8	-0.2	-0.9	-0.2	-0.2	-0.7	-0.9
1910	-0.1	-1.0	-1.4	-0.6	-0.5	-0.5	-0.6	-0.3	+0.2	-1.4	-1.1	-0.9	-0.7
1911	-1.0	+0.3	-0.3	+0.1	-0.6	-1.4	-0.2	+0.3	-0.2	-0.2	-0.6	+0.6	-0.3
Mean	6.0	5.5	4.8	4.2	4.2	4.1	4.1	5.1	6.0	6.4	6.6	6.3	5.3

TABLE 6.

MONTHLY BAROMETRIC PRESSURES. DEVIATIONS FOR THE NORMAL MONTHLY MEANS, IN INCHES.
(KENILWORTH.)

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897 ..	+026	+022	-022	+049	-014	+049	-054	+022	+002	-018	-005	-000	+004
1898...	-012	+051	-010	+018	-012	+028	-002	+104	+012	-011	-031	-005	+011
1899...	-005	-035	+014	+032	+070	+041	-011	-030	+012	-019	+034	+005	+009
1900...	-010	+025	+016	+032	+011	+002	-062	-032	+003	-016	-019	+005	-003
1901...	-024	-001	-000	+014	+013	+047	-001	+031	+011	+046	-013	-011	+008
1902...	-014	+027	-012	-058	+015	-055	-030	-052	-029	-066	+002	+024	-010
1903...	-005	+029	-030	-081	-048	-014	-033	-002	+053	-020	-035	-014	-017
1904...	+009	-039	+003	-013	+014	-003	+001	-011	+039	-021	+023	-005	+005
1905...	+004	-001	+035	+031	-040	-120	+059	+016	-047	+012	+033	-005	-004
1906...	+024	+018	+021	+007	-001	-029	+021	+009	-037	-002	+009	-012	+002
1907...	+012	-032	+010	-043	-058	+006	+063	+055	+006	+016	-039	-014	-000
1908...	+028	-028	-034	-046	+072	-033	+037	-023	-028	-053	-014	+004	-010
1909...	-015	-011	+004	+006	-020	+041	+017	-037	-001	-007	+017	-021	-003
1910...	+017	-024	-032	+017	-010	-028	-038	-034	-014	+008	+035	-010	-010
1911...	-034	-001	+031	+031	+002	+066	+039	-004	+017	+021	-010	-038	+011
Mean	26.021	26.058	26.085	26.153	26.204	26.270	26.268	26.212	26.163	26.088	26.046	26.023	26.133

TABLE 7.
MONTHLY BAROMETRIC PRESSURES. DEVIATIONS FROM THE NORMAL MONTHLY MEANS, IN INCHES.
(KIMBERLEY.)

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1890 ...	-.035	-.050	+.018	-.022	+.009	+.027	-.047	-.030	+.044	+.029	+.013	+.002	-.003
1891 ...	+.009	-.017	+.013	+.015	-.037	-.074	+.074	+.042	+.008	+.024	+.036	-.009	+.007
1892 ...	-.022	-.022	-.035	-.021	-.025	-.012	+.029	-.048	-.041	-.008	-.043	-.021	-.021
1893 ...	-.035	-.012	+.043	-.016	+.017	-.019	+.018	+.002	-.071	-.021	-.012	-.021	-.010
1894 ...	+.028	+.047	-.015	+.031	.000	-.019	+.004	+.003	+.003	-.029	+.002	+.020	+.007
1895 ...	+.006	-.015	+.005	-.006	+.017	+.037	-.059	-.006	+.028	+.004	+.012	-.009	+.001
1896 ...	+.021	+.030	+.006	-.040	+.018	-.005	+.019	+.002	+.010	+.023	+.010	+.043	+.012
1897 ...	+.029	+.040	-.034	+.046	-.006	+.067	-.039	+.038	+.020	-.023	-.018	-.005	+.010
Mean...	25.941	25.973	26.027	26.085	26.123	26.175	26.179	26.123	26.076	26.023	25.985	25.956	26.055

TABLE 8.
DEVIATIONS FROM THE NORMAL MONTHLY MEANS, IN PERCENTAGES OF THE OPTIMUM.
DURATION OF SUNSHINE.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897.....	5	7	6	2	3	6	7	1	9	4	2	8	1
1898.....	-16	-14	+3	0	+7	+4	+8	+1	+5	+3	0	+1	1
1899.....	2	+8	-3	-12	-2	+1	-10	-4	-7	0	-1	0	3
1900.....	8	0	-2	-5	+3	-3	-5	-1	+4	+2	+3	+6	1
1901.....	+6	+4	+3	-2	+12	-3	+3	-1	-7	-	+13	+4	1
1902.....	+9	+3	+9	+6	+9	+3	+3	+3	+2	+7	+4	+5	4
1903.....	-10	-1	+4	+7	+1	-3	-2	+5	+5	+2	+1	+2	4
1904.....	+2	-5	+5	+4	+2	-2	+7	-1	-7	-1	-4	+5	1
1905.....	+1	+11	+4	+12	-1	+5	+6	+10	+3	+1	-9	+3	3
1906.....	-2	0	-8	-10	-7	+1	+1	+6	-8	-	+6	+3	2
1907.....	+10	+2	-5	+5	+7	+3	+3	-6	+1	0	+1	-3	1
1908.....	-6	-10	+1	-1	+7	+3	-2	-3	-3	+2	+3	+5	3
1909.....	+3	-2	-	+2	-3	-5	-7	-3	+4	+6	-3	-2	2
1910.....	+2	+5	-8	-9	-12	-3	-4	-4	+2	-3	-7	+5	3
Mean	73 %	72 %	75 %	79 %	80 %	84 %	84 %	85 %	79 %	78 %	79 %	77 %	79 %

TABLE 9.
CLOUDINESS OF THE SKY. DEVIATIONS FROM THE NORMAL MONTHLY MEANS IN PERCENTAGES OF THE SKY.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	-1	-15	0	-1	-3	-8	-9	-1	-17	-9	-11	-3	-7
1898	+17	+7	-6	-2	+4	-10	-12	0	-12	-10	-4	-1	-3
1899	+3	-6	+3	+15	+2	-2	+14	+8	+2	+4	-1	+2	+3
1900	-4	-11	+1	+9	-6	+4	+6	+4	+6	+3	-6	+4	-1
1901	-12	+5	0	0	-18	+6	-9	+5	+7	+14	-2	-4	-2
1902	-11	-2	-6	-6	-10	-3	-1	-1	+5	-10	-17	0	-6
1903	-7	+7	-10	-4	-1	-3	+2	-4	+8	-12	-9	0	-5
1904	+10	+7	+7	-8	-9	+3	-4	-6	+7	+3	+3	-11	-1
1905	-2	+2	+2	+3	+10	+9	-7	+7	+12	0	+8	+3	+3
1906	+3	+12	-4	-13	0	-2	-2	-12	+2	+1	+22	-6	-2
1907	+8	+2	+10	+7	+9	+10	-3	-11	+2	+7	-9	+6	+3
1908	-16	+2	-12	+17	-9	-3	+3	+3	+16	0	-5	0	-4
1909	+17	+16	+9	-17	+16	0	-4	+9	-3	-2	+3	+8	+6
1910	-2	+8	+5	+7	+2	+3	+11	+8	-1	+8	+9	+0	+4
1911	-4	-2	+11	+13	+17	+2	+8	+4	-1	+5	+16	-5	+5
Mean	42%	44%	38%	30%	26%	19%	18%	17%	29%	34%	33%	37%	31%

TABLE 10.
MONTHLY DURATION OF RAINFALL, IN HOURS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Year.	Year.
1897	44	19	40	14	11	...	...	8	...	11	...	23	-154	170	-
1898	116	54	36	22	42	...	4	3	6	13	27	22	+21	345	+
1899	51	34	46	74	24	9	42	10	10	48	42	35	+101	425	+
1900	42	28	80	72	10	20	35	6	...	27	27	72	+95	419	+
1901	20	46	87	35	2	5	2	8	25	39	11	41	-3	321	-
1902	48	56	34	36	7	26	8	5	54	20	13	25	+8	332	+
1903	23	60	18	41	24	7	7	...	3	28	20	35	-58	266	-
1904	66	57	41	12	16	25	...	4	2	36	23	33	-9	315	-
1905	37	59	52	26	31	4	...	4	22	10	37	49	+7	331	+
1906	55	36	56	9	18	8	2	...	3	21	58	37	-21	303	-
1907	63	58	74	95	59	11	2	...	20	30	18	48	+154	478	+
1908	23	30	40	18	6	6	38	16	23	10	16	34	-64	260	-
1909	38	81	38	39	49	...	...	2	6	18	13	42	+2	326	+
1910	33	29	47	4	3	18	12	1	20	30	28	18	-81	243	-
1911	23	14	73	26	55	16	34	16	...	22	41	8	+4	328	+
Mean	45	44	51	35	24	10	12	6	13	24	25	35		324	

TABLE 11.

APPROXIMATE MONTHLY DURATION OF THUNDERSTORMS. DEVIATIONS FROM THE NORMAL MONTHLY MEANS, IN HOURS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897.....	-4	-5	+8	-1	1	2	-2	+3	-3	-3	-17	-12	-40
1898.....	+21	-7	-7	-4	-2	-2	-2	-1	-3	0	-3	+13	+6
1899.....	+6	-3	+11	+2	+5	+1	+10	+4	+2	-3	+10	0	+46
1900.....	-7	0	+21	+17	-2	0	+2	1	-4	+5	-7	+6	+30
1901.....	-2	+5	+8	+4	-2	+2	-	+2	-1	-8	-12	+13	+7
1902.....	-2	+3	-15	+7	-2	+3	0	+1	+14	+8	-6	-4	+8
1903.....	-2	+11	-14	+13	0	-2	-1	+1	-2	+3	+1	-1	+1
1904.....	-10	+4	-11	-9	-1	+4	-2	-1	-1	+3	+9	-8	+1
1905.....	+24	+1	-7	+2	-2	-2	-2	-1	+1	-11	+5	0	-22
1906.....	-16	1	-9	-10	+3	-2	-2	-1	-4	0	+23	+0	-17
1907.....	+10	+9	-6	-1	+2	-2	-2	-1	+4	+8	+2	-4	+16
1908.....	+5	-5	+31	-11	+2	+3	+2	0	-1	-13	+7	+6	+21
1909.....	+5	+4	+8	+4	-2	+2	+2	-1	-2	+1	+5	+8	-6
1910.....	-2	-11	+5	+8	-2	+1	-1	-1	+6	+6	-7	-12	-19
1911.....	-19	-7	-9	-4	+2	-1	+5	+2	-4	+4	+11	-7	-27
Mean	23	18	22	11	2	2	2	1	4	13	18	19	136

TABLE 12.

APPROXIMATE MONTHLY DURATION OF LIGHTNING WITHOUT THUNDER. DEVIATIONS FROM THE NORMAL MONTHLY MEANS,
IN HOURS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897.....	-25	-25	-12	+2	1	-2	-1	0	+1	-7	-10	-12	-90
1898.....	-6	-26	+5	-8	+4	-2	-1	-1	-4	-13	+8	+5	-41
1899.....	+14	+5	+34	+17	+1	-2	+9	+7	+1	+20	+17	-10	+118
1900.....	-13	+28	-6	-7	-4	-1	+2	+1	-5	-9	-9	+3	-19
1901.....	+8	+8	-13	-8	-5	-1	-1	+3	-1	-7	+1	+14	-1
1902.....	-2	+17	-14	+7	-4	-1	-1	-2	+10	0	-13	-20	-22
1903.....	+3	+7	-17	-1	+1	-2	0	-1	-5	+3	-6	0	-18
1904.....	-1	+18	-6	-17	-	+7	-1	-2	+6	-13	-8	-7	-19
1905.....	+4	0	+6	+7	0	-2	-1	-2	-5	+3	-8	+3	-1
1906.....	-10	+18	+6	-7	-	-2	-1	-2	+3	+23	+2	-4	-60
1907.....	+28	+1	+3	-5	+9	-	-	-	+7	-13	+1	+4	-34
1908.....	-7	-6	-8	-17	+1	0	0	+4	+7	+6	+10	+14	-57
1909.....	-3	+1	+17	+16	+2	-2	-1	-2	0	+2	+1	+3	-1
1910.....	+15	-5	+3	-14	-	+7	-1	-	-4	+3	+7	-	-8
1911.....	-4	-9	-10	+26	+3	-	+5	-1	-	+3	+7	-	-
Mean	25	26	28	17	5	2	1	2	5	15	16	22	164

TABLE 13.
MONTHLY TEMPERATURES IN THE SUN. DEVIATIONS FROM THE NORMAL MONTHLY MEANS.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	-2.7	+2.3	+0.3	+4.6	+3.6	+0.6	+1.5	+1.5	+1.5	+3.4	+0.1	+2.6	+1.6
1898	-9.6	-6.8	-1.7	+0.1	-2.6	+0.4	-0.1	+2.3	-0.1	-1.2	-0.4	+3.4	-1.4
1899	+1.5	+3.6	-1.1	-4.9	-4.2	+2.0	-4.6	-0.8	+2.0	-3.8	-0.5	+0.3	-0.9
1900	-0.1	+2.0	-1.4	-0.8	+4.2	+0.5	-4.9	-2.8	+5.2	+3.8	+0.9	-4.1	+0.2
1901	+1.7	+1.0	-2.0	+1.7	+0.2	+1.8	+1.6	+3.0	-3.0	-2.8	+0.8	-0.1	+0.3
1902	-4.4	-0.7	-2.2	-0.8	+4.1	-3.7	+2.0	0.0	-5.3	-0.6	-3.7	-4.1	-1.7
1903	-2.6	-0.5	+1.3	-1.3	+0.3	+1.5	+0.1	-0.2	-0.6	-4.5	-3.8	-0.6	-0.9
1904	-3.7	-0.7	-2.6	-1.1	-2.3	-1.0	+0.3	+0.5	+0.7	+1.7	+3.3	-1.9	-0.6
1905	+6.6	+1.3	+2.9	+4.4	+1.0	-2.2	+2.6	0.0	-2.0	+0.2	+1.9	+0.6	+1.4
1906	+0.9	-3.4	-2.9	+0.5	+1.1	+3.0	+3.4	+0.9	+1.3	-2.0	-0.3	-2.0	0.0
1907	+1.3	-2.0	+2.3	-4.5	-6.6	-0.1	+1.1	+3.6	-0.6	-2.4	-1.4	-2.7	-1.0
1908	+1.8	+1.5	+1.1	-4.2	+0.6	-3.1	-2.7	-4.5	-2.5	+1.0	-0.9	0.0	-1.0
1909	+5.2	-0.3	+3.3	+3.1	+2.8	+3.5	+4.7	+3.4	+4.4	+4.1	+5.1	+2.7	+3.5
1910	+3.5	+0.6	+6.1	+4.7	+3.9	+0.1	-1.8	-0.2	+0.7	+1.0	-0.7	+2.4	+1.7
1911	+1.1	+2.6	-3.3	-1.8	-6.8	-3.5	-2.8	-6.1	-1.6	+2.2	-0.1	+3.5	-1.4
Mean	153.3	152.6	144.8	135.5	124.9	118.4	119.4	126.9	136.3	142.5	149.7	153.7	138.2

TABLE 14.

MONTHLY MAXIMUM TEMPERATURES IN THE SHADE. DEVIATIONS FROM THE NORMAL MONTHLY MEANS.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	+39	+33	+06	+64	+24	+05	+17	+20	+01	+38	+03	+21	+16
1898	-56	-50	+23	+02	-26	+08	-03	+15	00	-16	+26	+25	-04
1899	+23	+51	+03	-32	-53	+03	-37	+10	+41	-03	-05	+15	-02
1900	+17	+53	+20	+11	+55	+11	-25	-19	+60	+17	+21	-39	+16
1901	+26	+06	-17	+10	-04	+08	-01	+25	-44	-30	-03	-01	-02
1902	-17	00	-14	-07	+48	-14	+25	00	-59	+01	-18	+18	-03
1903	+29	+15	+29	-17	-01	-07	+13	+06	+10	+02	-02	+13	+08
1904	-29	-18	-16	+19	+09	+09	+16	+02	-17	+03	+22	-37	-03
1905	+28	-11	+05	+28	+18	-15	+29	-17	-14	+38	+08	+05	+09
1906	+21	-20	-13	-01	+07	+12	+05	-20	+14	-30	-24	-26	-06
1907	-19	-28	+05	-44	-48	+09	-02	+23	-10	-20	-13	-36	-15
1908	+13	+28	+19	-42	+30	+06	-10	-04	+10	-01	+01	+04	+05
1909	-10	-56	-33	-10	-27	+20	00	+07	+04	-07	+23	-22	-09
1910	+08	-26	+10	+27	+21	-15	-10	-08	00	-24	-34	+11	-03
1911	+11	+30	-22	-10	-53	-36	-24	-34	00	+28	-04	+56	-05
Mean	88.8	88.0	82.9	77.0	70.1	64.7	65.9	71.0	78.0	81.5	86.1	89.6	78.6

TABLE 15.
MONTHLY MINIMUM TEMPERATURES IN THE SHADE. DEVIATIONS FROM THE NORMAL MONTHLY MEANS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	-2.1	-1.2	-1.1	+3.7	+1.7	-1.3	-0.5	+1.3	-2.4	+1.4	-3.2	+1.5	0
1898	+0.8	-2.2	-0.2	-1.2	+0.6	-2.0	-3.1	-0.4	-3.6	-2.7	+2.0	+0.3	-0.9
1899	-0.1	+2.0	+2.0	+1.0	-1.7	+0.1	+2.3	+2.8	+3.4	+1.3	+0.4	+0.3	+1.2
1900	-0.1	+1.1	+2.0	+3.6	+2.7	+2.8	+2.4	-0.8	+1.9	-0.5	+0.3	-0.6	+1.3
1901	-0.3	+1.5	+0.4	+3.3	-3.0	+2.1	-2.6	+2.5	+0.5	+0.8	-0.2	+0.8	+0.5
1902	-1.9	-0.1	-1.2	-2.4	+0.7	-1.8	-0.2	-0.3	-1.4	+0.8	-3.3	+0.1	-0.9
1903	-0.4	+1.0	-3.0	-3.1	-1.5	-3.0	-0.4	+0.3	-0.7	-2.0	-2.0	+1.5	-1.1
1904	+0.5	-1.4	+0.8	-1.5	-1.7	+0.1	+0.1	-1.4	-1.4	-0.3	+0.8	-3.6	-0.7
1905	-0.1	+0.3	-0.9	+2.8	-0.6	-1.7	+1.8	-1.4	+0.1	+0.7	+2.2	+2.3	+0.5
1906	+2.4	-1.0	-1.2	-3.2	+1.2	+1.0	-1.5	-4.7	+0.2	-0.9	+3.1	-1.6	-0.5
1907	+0.5	0.0	+1.7	+1.5	-0.1	+1.5	-0.4	-0.4	+1.6	-0.3	-1.9	-1.7	+0.2
1908	-2.4	+0.3	-1.9	-6.6	-0.4	-1.0	+1.9	+1.6	+2.1	-1.0	+0.3	+0.9	-0.5
1909	+2.1	+0.4	-0.3	+2.3	+1.9	+3.7	+0.8	+0.3	+0.8	-1.2	+0.6	-0.4	+0.9
1910	+0.3	-0.5	+2.2	-0.1	-0.2	-1.4	0.0	-0.7	-0.1	+0.1	-2.2	-1.2	-0.3
1911	+0.9	+0.3	+0.3	-0.4	+0.9	+0.3	+0.1	+0.9	-1.3	+3.1	+3.7	+1.5	+0.9
Mean	61.6	61.2	57.4	50.4	42.1	36.1	35.8	38.9	45.8	50.9	54.9	60.4	49.6

TABLE 16.

MONTHLY MINIMUM RADIATION TEMPERATURES AT A HEIGHT OF FIVE INCHES ABOVE THE GRASS. DEVIATIONS
FROM THE NORMAL MONTHLY MEANS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	-2.2	-1.9	-1.5	+3.3	+1.1	-1.1	-1.0	+1.8	-2.5	+1.3	-4.0	+1.7	-0.4
1898	+1.9	-2.0	-0.5	-1.4	+0.9	-2.0	-3.5	-0.1	-2.9	-1.9	+3.0	+1.0	-0.6
1899	+0.8	+2.2	+3.3	+2.4	-0.6	+1.3	+4.5	+4.3	+4.1	+2.7	+2.2	+1.7	+2.4
1900	+0.3	+1.1	+2.5	+4.5	+3.4	+3.9	+4.2	+0.6	(+2.2)	+0.9	+1.5	+0.8	+2.2
1901	-0.9	+1.9	+1.4	+4.2	-3.0	+2.8	-2.6	+2.4	+1.4	+1.1	-1.0	+0.8	+0.7
1902	-2.0	-0.1	-1.2	-2.4	-0.3	-1.4	+0.1	+0.1	-0.6	+1.1	-3.9	+0.2	-0.8
1903	-0.5	+1.3	-4.3	-3.4	-1.5	-3.4	-1.0	+0.2	-1.5	-2.5	-2.3	+1.0	-1.5
1904	+1.3	-1.5	+1.1	-2.1	-2.3	+0.3	-0.4	-1.9	-1.5	-0.6	+0.6	-4.8	-1.0
1905	-1.3	-0.3	-1.5	+1.7	-1.1	-1.7	+1.0	-1.9	+0.3	-0.3	+2.7	+2.7	0.0
1906	+2.7	-1.2	-0.7	-3.8	+1.2	+0.9	-2.6	-5.9	-0.6	-1.4	+3.8	-1.7	-0.8
1907	+0.8	+0.3	+1.6	+3.1	+0.8	+1.2	-0.8	-1.8	+2.1	+0.1	-2.8	-1.9	+0.2
1908	-2.7	+0.4	-2.2	-7.0	-1.2	-1.2	+2.4	+1.9	+2.0	-1.8	+0.5	+1.2	-0.6
1909	+2.4	+1.2	-0.3	+2.7	+2.1	+2.9	-0.3	0.0	+0.5	-2.2	-0.4	-0.8	+0.7
1910	-0.2	-0.6	+1.6	-1.5	-1.3	-2.1	-0.3	-0.7	-0.2	+0.4	-2.9	-1.7	-0.8
1911	+0.1	-0.8	+0.5	0.0	+1.5	+0.3	+0.5	+1.2	-2.6	+2.6	+3.4	-0.7	+0.5
Mean	57.6	57.4	53.6	45.9	37.5	31.1	30.7	34.0	41.2	46.3	50.0	56.1	45.1

TABLE 17.
MONTHLY MEAN TEMPERATURES OF THE DRY BULB. DEVIATIONS FROM THE NORMAL MONTHLY MEANS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	-3.4	+1.3	0.0	+5.3	+2.4	-0.7	+0.4	+1.6	-1.2	+2.3	-0.9	+1.3	0
1898	-3.0	-4.0	+0.8	-0.6	-1.2	-0.4	-1.9	+0.3	-1.5	-1.8	+1.9	+1.3	-0.8
1899	+0.8	+3.7	+0.6	-1.4	-3.5	+0.3	-0.2	+1.9	+3.3	+0.5	-1.0	+0.4	+0.4
1900	+0.2	+3.0	+1.5	+2.0	+3.6	+1.8	+0.2	-1.3	+3.9	+0.7	+1.5	-2.9	+1.2
1901	+1.3	+0.8	-1.1	+2.0	-1.7	+1.4	-1.6	+2.0	-2.2	-1.7	+0.1	+0.1	-0.1
1902	-1.5	-0.3	-1.1	-1.8	+2.4	-1.8	+0.8	0.0	-4.1	+0.3	-2.1	+1.3	-0.7
1903	+2.2	+0.9	+0.6	-2.3	-0.9	-2.0	+0.1	+0.6	+0.3	-0.7	-0.6	+0.9	-0.1
1904	-1.6	-2.2	-0.6	+0.6	-0.5	+0.4	+0.7	-0.7	-1.0	+0.2	+1.7	-3.1	-0.5
1905	+1.2	-0.6	-0.3	+2.7	+0.6	-1.5	+2.2	-1.5	-0.6	+2.4	+1.5	+1.2	+0.6
1906	+2.3	-1.1	-0.9	-1.3	+1.0	+1.2	-0.7	-3.3	+0.8	-1.8	-0.5	-2.4	-0.6
1907	-0.9	-1.7	+0.7	-1.8	-2.6	+1.1	-0.1	+0.8	+0.1	-1.4	-1.6	-2.9	-0.9
1908	-0.2	+1.8	+0.4	-4.9	+1.4	0.0	+0.5	+0.7	+1.6	-0.3	+0.1	+1.1	+0.2
1909	+0.2	-2.8	-2.0	+0.6	-0.2	+3.0	+0.7	+0.6	+0.9	-0.6	+2.1	-1.4	+0.1
1910	+0.8	-1.3	+1.8	+1.5	+0.7	-1.0	-0.1	-0.2	-0.1	-1.6	-3.0	+0.2	-0.2
1911	+1.6	+1.9	-0.8	-0.7	-2.0	-1.5	-0.9	-1.2	-0.4	+2.8	+1.2	+4.6	+0.4
Mean	74.4	73.5	69.0	62.5	54.8	48.8	49.3	53.9	61.2	65.9	70.4	74.7	63.2

TABLE 18.

MONTHLY MEAN TEMPERATURES OF THE DEW-POINT. DEVIATIONS FROM THE NORMAL MONTHLY MEANS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897	+3.4	-1.6	-0.9	+1.6	+0.3	-0.7	+0.2	+0.9	-3.3	-0.2	-6.8	-0.3	0
1898	+6.8	0.0	+0.6	-0.9	+1.5	-2.8	-4.5	-0.2	-3.7	-1.4	+2.9	-0.1	-0.2
1899	-1.1	-2.2	+3.8	+4.0	+1.3	+1.4	+5.8	+4.5	+2.0	+3.6	+2.4	+0.2	+2.1
1900	-0.8	-2.4	+3.2	+5.4	+2.0	+2.5	+5.3	+1.0	-0.2	-1.7	-1.3	+4.4	+1.4
1901	-4.5	+1.6	+3.1	+5.1	-3.4	+1.1	-3.1	+1.7	+4.2	+4.3	-0.2	+3.3	+1.1
1902	-1.5	+1.0	-0.6	-1.3	-1.1	-0.6	+0.3	+0.1	+3.5	+1.2	-3.0	0.0	-0.2
1903	-4.3	+0.5	-8.7	-2.9	-1.1	-3.5	-1.5	0.0	-2.7	-3.7	-2.1	+0.6	-2.5
1904	+3.1	0.0	+2.4	-4.1	-2.9	-0.3	-1.8	-2.2	-2.4	-0.2	-0.3	-4.8	-1.2
1905	-1.1	+0.4	-1.9	+1.8	-3.3	-0.9	-0.9	-1.8	+0.8	-3.4	+3.2	+1.0	-0.5
1906	+1.5	-0.5	-2.3	-5.2	+0.9	-0.6	-3.9	-5.4	-2.0	0.0	+4.5	-0.3	-1.1
1907	+1.8	+3.5	+1.3	+4.1	+2.8	+0.5	-1.5	-2.4	+2.7	+0.9	-1.0	+2.7	+1.2
1908	-5.2	-1.6	-5.5	-8.2	-2.5	-2.6	+2.2	+2.4	+1.9	-2.5	-1.0	+0.9	-1.8
1909	+4.5	+4.8	+2.1	+3.8	+4.3	+4.8	+1.0	-0.4	+2.0	-1.9	-1.9	+0.4	+1.9
1910	-1.1	+0.6	+2.2	-3.4	-2.1	-0.5	+0.8	-1.2	+0.2	+2.8	-0.6	-3.2	-0.5
1911	-2.2	-3.9	+0.8	-0.4	+3.7	+2.4	+1.9	+3.3	-2.7	+2.3	+5.0	-4.5	+0.4
Mean	52.3	53.3	52.5	47.0	39.1	34.2	32.9	33.3	37.3	41.0	43.3	48.2	42.9

TABLE 19
MONTHLY MEAN PERCENTAGES OF RELATIVE HUMIDITY. DEVIATIONS FROM THE NORMAL MONTHLY MEANS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1897.....	+11.5	- 5.6	- 1.3	- 7.2	- 4.7	- 0.4	0.0	- 1.8	- 4.2	- 3.8	- 9.5	- 2.2	- 2.3
1898.....	+17.8	6.5	- 0.5	- 1.2	5.9	- 6.0	- 6.2	- 0.6	- 4.3	+ 0.5	+ 2.2	- 1.9	+ 1.0
1899.....	- 1.7	- 9.0	+ 6.3	+ 11.9	+ 9.5	+ 2.8	+ 14.3	+ 5.7	- 2.4	+ 5.9	+ 5.4	- 0.5	+ 4.0
1900.....	- 1.6	- 8.4	+ 3.8	+ 7.7	- 3.5	+ 2.0	+ 12.0	+ 4.4	- 6.2	- 3.5	- 3.5	+ 11.8	+ 1.2
1901.....	- 10.0	+ 1.2	+ 8.5	+ 6.4	- 4.6	- 1.3	- 3.7	- 0.1	+ 11.7	+ 9.8	- 1.3	+ 4.6	+ 1.7
1902.....	- 0.1	+ 1.6	+ 0.3	+ 1.3	- 7.4	+ 3.3	- 0.8	0.0	+ 13.3	+ 1.0	- 2.4	- 1.3	+ 0.7
1903.....	- 10.2	- 1.2	- 17.6	- 1.7	- 0.1	- 3.7	- 4.1	- 1.5	- 5.7	- 5.1	- 2.0	- 0.9	- 4.5
1904.....	+ 7.7	+ 3.7	+ 5.6	- 9.6	- 5.8	- 1.5	- 5.9	- 3.2	- 3.6	- 1.1	- 2.5	- 3.4	- 1.7
1905.....	- 4.1	+ 1.9	- 2.8	- 1.8	- 7.8	+ 1.7	- 6.9	- 1.4	+ 3.0	- 9.0	+ 3.0	- 0.4	- 2.1
1906.....	- 1.4	0.0	- 3.0	- 8.1	0.0	- 3.8	- 7.5	- 5.2	- 5.2	+ 2.7	+ 8.5	+ 2.4	- 1.8
1907.....	+ 3.7	+ 8.4	+ 1.5	+ 12.7	+ 11.3	- 1.7	- 3.9	- 6.5	+ 4.6	+ 2.8	+ 1.0	+ 8.1	+ 3.5
1908.....	- 8.4	- 5.9	- 10.9	- 7.4	- 8.3	- 6.3	+ 4.1	+ 4.0	+ 0.9	- 3.2	- 2.6	0.0	- 3.7
1909.....	+ 7.0	+ 14.2	+ 7.5	+ 6.7	+ 9.7	+ 4.2	+ 0.3	- 1.4	+ 2.0	- 3.5	- 5.8	+ 1.0	+ 3.5
1910.....	- 3.0	+ 2.2	- 0.1	- 10.2	- 6.6	+ 0.8	+ 1.8	- 2.5	+ 0.6	+ 7.1	+ 2.5	- 5.5	- 1.1
1911.....	- 6.8	- 10.3	+ 3.1	+ 10.1	+ 12.6	+ 9.2	+ 6.2	+ 9.5	- 4.7	- 0.2	+ 6.3	- 12.5	+ 1.0
Mean	51.2	54.3	60.4	60.9	59.3	60.1	56.3	48.9	44.9	44.6	42.1	44.1	52.3%

TABLE 20.
ANNUAL RAINFALL.

Year.	Kimberley.	Year.	Kenilworth.
	Inches.		Inches.
1877	13·58	1894	24·51
8	9·34	5	15·60
9	19·38	6	21·07
1880	15·43	7	8·85
1	30·30	8	18·29
2	14·77	9	19·39
3	11·21	1900	18·78
4	18·43	1	22·23
5	9·63	2	22·25
6	14·44	3	12·25
7	18·74	4	17·64
8	17·34	5	14·02
9	17·49	6	17·89
1890	23·11	7	24·74
1	31·30	8	12·92
2	12·88	9	20·39
3	16·25	1910	15·44
4	25·03	1	13·10
5	15·98		
6	19·86		